

## MITOCW | 12.1 Equivalence Principle

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**PROFESSOR:** Welcome back to [? A20, ?] special relativity. Very early in this lecture, we discussed what mass is and how we can understand the mass of a proton and the mass of an electron as it interacts with the Higgs background field. But here, the question is slightly different.

You want to understand the difference or the lack of difference between the mass in a gravitational field compared to the inertial mass, a mass being pushed through some force. And it's probably Einstein's biggest realization that those two things are the same. And that finding is called the equivalence principle, the equivalence of the gravitational and inertial mass.

So if you are a freely falling person, you will not feel your own weight in your gravitational field. You will just drop. And the gravitational field provides an acceleration. And that acceleration, if you are standing in an elevator or just sitting on a chair like I'm doing right now, then sets up an accelerating reference frame. So there is an equivalence between being accelerated or being stationary in a gravitational field.